

REMARKS

The Examiner again rejected claims 1-6, 11, 13, and 16-21 pursuant to 35 U.S.C. §102(b) as anticipated by Yoshihiro (JP 10-94519). Claim 11 was again rejected pursuant to 35 U.S.C. §102(b) as anticipated by Yoshiya (JP 02-161934). Claims 8-9 and 14 were again rejected pursuant to 35 U.S.C. §103(a) as being unpatentable over Yoshihiro and Yoshiya. Claims 13-15 were again rejected pursuant to 35 U.S.C. §103(a) as being unpatentable over Yoshiya and Mo, et al. (U.S. Patent No. 6,733,455). Claims 7, 10, and 12 were objected to as allowable if amended into independent form. Applicants respectfully request reconsideration of the rejections of claims 1-6, 8-9, 11 and 13-21, including independent claims 1, 5, 11, and 20.

Independent claim 1 recites determining a rate of change of a parameter as a function of a difference in time between first and second images associated with different times, calculating a positional change in the parameter between the first and second images associated with different times, the positional change being displayed as a function the rate of change and being a function of the difference in time, and displaying the change in the parameter. Yoshihiro does not disclose these limitations.

First, Yoshihiro does not disclose determining a rate of change of a parameter. Yoshihiro determines the shape of a blood vessel wall (paragraph 12). Using fluid dynamics, the rate of blood in the vessel is calculated (paragraph 31). For the fluid dynamics, a pressure is used to determine the rate or velocity (paragraphs 31 and 35-36). For each heart cycle phase, a new calculation is made based on a new wall shape (paragraph 47). For a given phase, the rate, pressure, and direction are calculated for a plurality of locations. However, the rate is the rate of flow of blood, but not a rate of change of a parameter. Pressure is not rate of change. Direction is not rate of change. Yoshihiro does not disclose determining rate of change of a parameter.

The Examiner notes that Yoshihiro is concerned with determining changes in blood flow and cites to paragraph 7 as showing "rate of flow." However, Yoshihiro shows changes in blood flow by determining a sequence of images, each showing rate, pressure, and direction. The user is left to visually perceive any changes in rate. The "rate-of-flow" in the translation is taught in a summary or means for solving the problem. In the detailed

embodiment, the rate of flow is described as rate. A rate or a rate of flow is not a rate of change of flow. Velocity is not acceleration. Yoshihiro discloses determining a rate of flow, not a rate of change of flow. While the flow may be changing, Yoshihiro does not determine rate of the change. Instead, the rate of flow is shown to the user. The user may perceive any change by viewing a sequence of images, but the rate of change is not determined and used for displaying as a function of the rate of change. The display is the rate-of-flow, not a function of the determined rate of change.

Second, claim 1 recites that the rate of change is determined as a function of the difference in time between first and second images. Yoshihiro determines the rate of flow (velocity) for each given image. The rate of change is not a function of a difference in time between two images associated with different times.

The rate calculated by Yoshihiro is blood flow at a given time. Different images show the flow at different times or phases, providing a display of the velocity as a function of time. However, a positional change between two images is not displayed as a function of the difference in time. Yoshihiro relies on independent calculation of the velocity in each phase based on the wall shape. The difference in time between phases is not used in the determination of any positional change.

Independent claim 5 recites assigning first display values to each of a first plurality of spatial locations of a first image, tracking a flow direction and magnitude for each of the first plurality of spatial locations, identifying a second plurality of spatial locations as a function of the flow directions and magnitudes, the second plurality of spatial locations corresponding to locations in a second image, and assigning second display values of the second image to each of the second plurality of spatial locations as a function of the first display values of the first image such that the second display values have a perceived similarity to the first display values but shifted spatially between the first and second images. Yoshihiro does not disclose these limitations.

First, Yoshihiro does not track between images and assign second display values as a function of first display values. Yoshihiro determines flow direction and magnitude in a still picture (paragraphs 45-47). The animation of Figure 7 merely shows the calculations for a sequence of different times (paragraphs 47-48). The flow direction is calculated separately for

each image, not tracked between images. Display values are calculated for each image independently.

The Examiner cites to tracking flow direction and magnitude as determining the flow direction and magnitude for each image. By making these calculations for each image in a sequence, the direction and magnitude are tracked as a function of time. However, claim 5 recites assigning second display values as a function of the first display values based on the tracking. Yoshihiro determines the direction and magnitude for each image. The display values for each image show the direction and magnitude. Any similarity between images results from similarity in vessel wall shape, not using display values of one image in the determination of display values for a second image. Yoshihiro does not assign second display values as a function of other display values where the location of the second display values is a function of the direction and magnitude for the first display values.

Second, claim 5 recites that second display values of the second image for each of the second plurality of spatial locations are assigned as a function of the first display values of the first image such that the second display values have a perceived similarity to the first display values but shifted spatially between the first and second images. Yoshihiro assigns display values based on the flow calculations from vessel shape for a given phase. At different times, the wall shape for the vessel is the same or different. If the shape for a different phase is the same, the calculation would result in the same image. If the shape for a different phase is different, a different image results. The different image may have similarities to the image of a different phase, but merely due to similar wall shape. The display values of a second image are not a function of the display values of the first image.

For example, Yoshihiro displays a same image with a same wall shape for different phases. The same images show for a same location a same magnitude and direction of flow. Conversely, claim 5 recites that the display values are shifted spatially. Since the different phases occur at different time, the display values of the second image are shifted by the magnitude and direction relative to the first image, but have similar values at the shifted location for perception by the user. Where Yoshihiro has different wall shape and thus different flow in the same locations, any similarity is based on the input wall shape, not on the previous display values.

Independent claim 11 recites generating a first pattern for pixels of a first image, determining a spatial offset between the first image and a second image as a function of the flow, and generating a second pattern for the pixels associated with flow for the second image, the second pattern determined as a function of the first pattern, the second pattern being positioned in the second image as a function of the spatial offset. Yoshihiro and Yoshiya do not disclose these limitations.

Yoshihiro uses fluid dynamics to calculate flow rate, direction and pressure in each image of a sequence. The calculations of one image appear to be independent of the other images. Yoshihiro does not disclose the pattern for one image responsive to the pattern of another image.

The Examiner alleges the second pattern (figure 7B) is responsive to the first pattern (figure 7A) because the second pattern represents, through shift in the streams, the change in the first pattern over a time period. However, this relationship of the underlying flow between images does not provide a pattern responsive to another pattern. Each image in Yoshihiro is independent. The calculation for each image provides an independent pattern. The independent pattern is responsive to the underlying flow, but the flow for each image is independent. The flow may be similar due to similar vessel boundaries, but is independently calculated. The user may perceive a similarity or change, but the flows and resulting pixel values are independent. One pattern is not responsive to another pattern.

To clarify this distinction, claim 11 recites that the second pattern is determined as a function of the first pattern. Yoshihiro determines the display values independently. Any similarity is due to the similarity of input parameters (e.g., wall shape). Yoshihiro does not determine a pattern in one image as a function of a pattern in another image.

Yoshiya determines velocities for each of a sequence of images (page 4, 2nd to last paragraph). Acceleration between pairs of velocity images is determined (page 4, last paragraph and page 5, 5th and 6th paragraphs). The acceleration is displayed as a gray stripe in a color flow map (page 5, 6th paragraph). By determining acceleration between different pairs of images, a sequence of acceleration images may be generated (page 6, 2nd-4th paragraphs). Yoshiya determines acceleration for each image independently of acceleration for a previous image. Yoshiya does not suggest one pattern being determined as a function

of another pattern.

The Examiner notes the overlap of velocity information (i.e., one frame of velocity being used for different acceleration images- $a1=v1-v2$ and $a2=v2-v3$ where $v2$ is used in both). However, claim 11 recites the pattern as pixels for images, not underlying data used to calculate display values. The acceleration pattern of one image is not used for another image. The overlap of velocity information does not alter this. Acceleration is not provided by a single frame of velocity. Two acceleration images both being a function of a same frame of velocity does not result in the final acceleration pattern of one image being responsive to an acceleration pattern of another image.

Yoshiya does not determine a position of one pattern as a function of a spatial offset. The underlying velocity data may overlap between acceleration determinations. However, the patterns are not display patterns. The position in an image is not determined for spatially offsetting a pattern.

Independent claim 20 recites a persistent pattern shifted in an image relative to another image. Yoshihiro calculates the pattern for each image independently. Any pattern similarity is arbitrary, and is not a persistent pattern shifting in an image.

The underlying streams or flow is not a pattern in an image. The image may represent flow patterns, but the pattern in an image is not shifted as a persistent image pattern. The pattern of one image is not calculated as a function of the pattern in the other image.

Dependent claims 2-4, 6, 8-9, 13-19, and 21 depend from one of the independent claims above, so are allowable for the same reasons. Further limitations patentably distinguish from the cited references.

Claims 2-4 recite rate of change, so are allowable.

Claim 6 recites a pattern of one image responsive to a pattern of another image, so is allowable.

Claims 18 and 19 recite a shifted pattern, so are allowable.

Claim 21 recites tracking and values of one image being a function of values of another image, so is allowable.

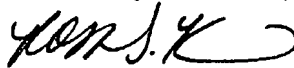
CONCLUSION:

Applicants respectfully submit that all of the pending claims are in condition for allowance and seeks early allowance thereof. If for any reason, the Examiner is unable to allow the application but believes that an interview would be helpful to resolve any issues, he is respectfully requested to call the undersigned at (650) 694-5330 or Craig Summerfield at (312) 321-4726.

PLEASE MAIL CORRESPONDENCE TO:

Siemens Corporation
Customer No. 28524
Attn: Elsa Keller, Legal Administrator
170 Wood Avenue South
Iselin, NJ 08830

Respectfully submitted,


Rosa S. Kim, Reg. No. 39,728
Attorney(s) for Applicant(s)
Telephone: 650-694-5330
Date: 11-2-07